

Date: Thursday, 29/05/2008 2:34:25 PM  
 User: Julie Lecocq

## Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services		Drawing Name	: HIGH AFT X-TUBE 412			
Job Number	: 39580						
Estimate Number	: 10559						
P.O. Number	:			Part Number	: D412664203		
This Issue	: 29/05/2008	S.O. No. :			Drawing Number	: D412-664-243 REV D	
Prsht Rev.	: NC			Project Number	: N/A		
First Issue	: / /		Type	: CROSSTUBES			
Previous Run	: 39579			Drawing Revision	: D		
Written By	:			Material	:		
Checked & Approved By	: <u>JUL 08.5.29</u>			Due Date	: 10/06/2008		
Comment	Est Rev:E 04.02.16 Reformat; Added D3189-1 K/DS Est Rev:F 06-03-29 Remove Coments on Pick List JLM Est Rev:G 06.12.08 per ECN 886 EC Est Rev:H 07-04-30 As per Rev D JLM						

## Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0	DC	DOCUMENT CONTROL
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JUL 08.6.17



808/06/17

Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D412-664-203 CHG 006

2.0	PACKAGING 1	PACKAGING RESOURCE #1
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Comment: PACKAGING RESOURCE #1

3.0	D412664203TRN	CROSSTUBE TURNING DETAIL
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Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch 039581

① 11 8-6-4

4.0	BENDING	BENDING MACHINE - SKIDTUBES
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Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010

EL 8-6-5

5.0	QC15	DIMENSIONAL CHECK OF X-TUBES
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Comment: DIMENSIONAL CHECK OF X-TUBES

J 08-06-050

B 39580 D412-664-203

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Job Number: 39580

Part Number: D412664203

Job Number:



Seq. #:	Machine Or Operation:	Description :
6.0	CROSSTUBES	CROSSTUBES RESOURCE 1
<p>Comment: LANDING GEAR RESOURCE 1</p> <p>1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 &amp; DT8551</p> <p>2-Ream hole to finish size in tube as per Dwg D412-664-243 using drill Jig DT8550 &amp; DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.</p> <p>3-Deburr &amp; Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243</p> <p><i>PL/SL 8-6-5</i></p>		
<p><i>AWM 8-6-5</i></p>		
7.0	HAND FINISHING1	HAND FINISHING RESOURCE #1
<p>Comment: HAND FINISHING RESOURCE #1</p> <p>Chemical Conversion Coat as per QSI 005 4.1</p> <p><i>AWM 8-6-5</i></p>		
8.0	QC3	INSPECT POWDER COAT/CHEMICAL CONVERSION
<p>Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION</p> <p><i>6/06/05 (40)</i></p>		
9.0	QC5	INSPECT WORK TO CURRENT STEP
<p>Comment: INSPECT WORK TO CURRENT STEP</p> <p><i>6/06/05 (41)</i></p>		
10.0	OUTSIDE SERV.10	OUTSIDE SERVICES-skids
<p>Comment: Sub-Contracting OUTSIDE SERVICES</p> <p>Liquid Penetrant Inspection as per QSI 038Or</p> <p>Issue P/O: <u>6525</u> LPI as per ASTM 1417</p> <p>Level 2 Attach copy of NDT results to work order</p> <p><i>6/08/06/09 (1)</i></p>		
11.0	PACKAGING 1	PACKAGING RESOURCE #1
<p>Comment: PACKAGING RESOURCE #1</p> <p>Inspect for transit damage</p> <p>Ensure copy of NDT results attached to work order.</p> <p><i>PL/SL 8-6-9 (C)</i></p>		

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Drawing Name: HIGH AFT X-TUBE 412

Job Number: 39580

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

12.0 QC5

INSPECT WORK TO CURRENT STEP



ml 08/06/10



(1)

Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

13.0 SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

ml 08 06 10

(1)

14.0 QC14

INSPECT SPRAY PAINT



ml 08 06 10

Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

15.0 D3595063570

RUBBER CUSHION



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Rubber Cushion

Batch: 35126

ml 08 06 12

16.0 D2856600

Abrasion Strip



Comment: Qty.: 1.7640 f(s)/Unit Total : 1.7640 f(s)

Pick:

Qty Part number Description Batch

2 D2856-600(Cut to 10.090") Abrasion Strip 36398

ml 08 06 11

17.0 D28961

Support



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D2896-1 Support 33411

ml 08 06 12

18.0 D31891

Chafing Shield



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D3189-1 Chafing Shield 37884

ml 08 06 11

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Drawing Name: HIGH AFT X-TUBE 412

Job Number: 39580

Part Number: D412664203

Job Number:



Seq. #:

Machine Or Operation:

Description :

19.0 MS2192028

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Pick:

Qty Part number Description Batch  
4 MS21920-28 Clamp 107502

ML 08 06 11

20.0 MS2192030

clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

clamp(per MIL-DTL-8783C)  
batch: 106810

ML 08 06 12

21.0 CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

Assemble as per Dwg D412-664-203

1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

ML 08 06 12 ①

2-Install supports with magnobond as per QSI 015 Adhere for for 12 Hrs

A/R 6398 Magnobond Batch: 107621

Expiry Date: 08/12/09

Time: 11:00 AM

3-Install clamps as per Dwg D212-664-141. Torque clamps to 80-100 in lb.

ML 08 06 13 ①

22.0 QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

① P10

23.0 PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Pick Packing Kit

24.0 AN640A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: M67376

ML 08 06 17 ①

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Drawing Name: HIGH AFT X-TUBE 412

Job Number: 39580

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

25.0 AN641A Bolt



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Bolt

Batch: M107013

AS 08/06/17 (x)

26.0 AN960JD616 Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)

Washer

Batch: M107042

AS 08/06/17 (x)

27.0 MS21042L6 Nut



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)

Nut

Batch: M105077

AS 08/06/17 (x)

28.0 QC4 INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

29.0 PACKAGING 1 PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D412-664-203

\*\*\*\*\*Ensure tube is not packaged if curing time is less than 12 hrs, see step 27 for application time & date  
\*\*\*\*\*

Time & date of packaging: 08/06/17 1:20pm

Location:

PPP Rev: Rev G

AS 08/06/17 (x)

30.0 QC21 FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

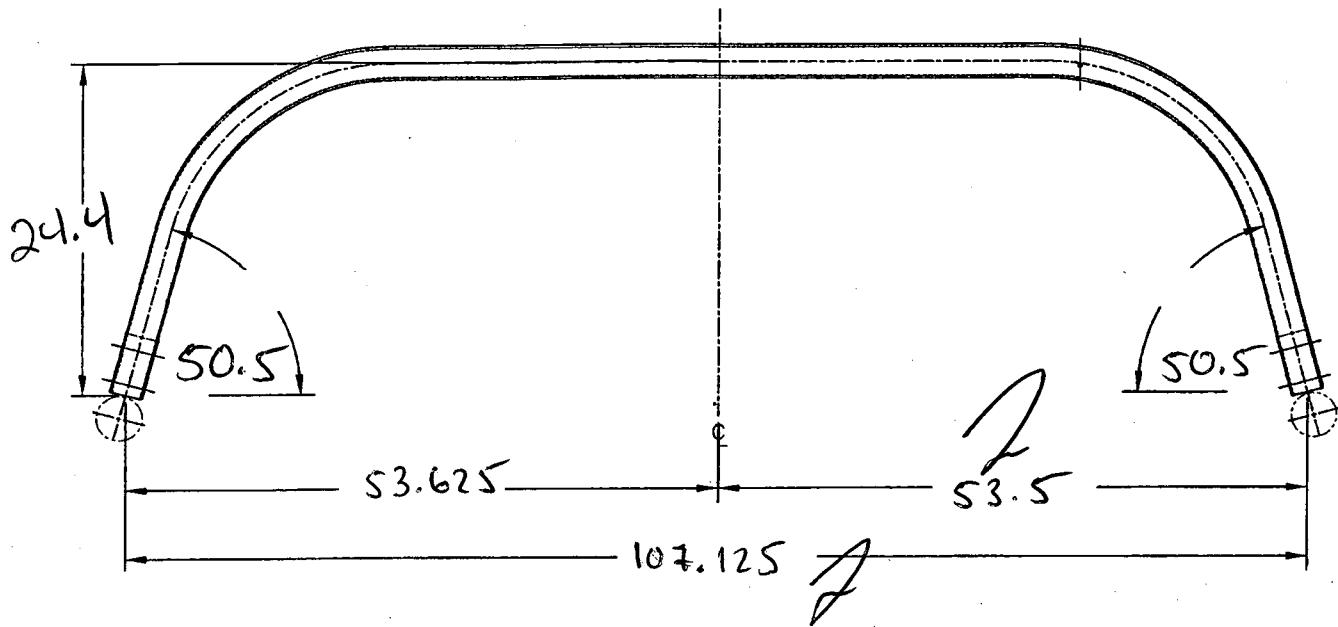
Job Completion



u 08/06/18

DART AEROSPACE LTD	Work Order:	39580
Description: Crosstube High Aft (412)	Part Number:	D412-664-203
Inspection Dwg: D412-664-243 Rev: D		Page 1 of 1

Required Dimension	Min	Max
Height	24.24	24.50
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.70



Comments

QC15 Inspection	<i>QC15/12</i>
Date	<i>08.06.05</i>

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	<i>JM</i>
B	07.05.08	Dimensions updated per Dwg rev. D	KJ/JLM <i>JLM</i>	<i>JM</i>

**DART**

DESIGN <i>PH</i>	DRAWN BY <i>PH</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>GP</i>	APPROVED <i>JH</i>	DRAWING NO. D412-664-243	REV. D SHEET 1 OF 3
DATE 07.03.09		TITLE CROSSTUBE ASSEMBLY (412 HI AFT)	SCALE NTS
A	01.10.17	NEW ISSUE	
B	05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	
C	06.10.27	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398 MS21920-32 WAS MS21920-30	
D	07.03.09	REMOVE D2732-058, CHANGE TO D3595-063-570	

**RELEASED**07.04.24 *##*

Qty	Part Number	Description
X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
1	D6009-129	CROSSTUBE
2	D3595-063-570	RUBBER CUSHION
1	D2896-1	SUPPORT
2	D2856-600-1009	ABRASION STRIP
4	MS21920-28	CLAMP
2	MS21920-30	CLAMP (OR MS21920-32)
2	D3189-1	CHAFING SHIELD
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

**GENERAL NOTES:**

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6009-129  
FINISHED LENGTH =  $124.09 \pm 0.020$
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

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WORK ORDER
NO. *34580*

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# LIQUID PENETRANT TEST REPORT

P-09176

CLIENT DART AEROSPACE  
ATTENTION LINDA LACELLE  
ADDRESS 1270 ABERDEEN ST.  
HAWKESBURY, ON  
PROJECT 3 X 203, 2X 101  
ITEM(S) EXAMINED 203-39579, (39580) 38965  
101-39274, 39273

DATE JUNE 09 2008  
ACUREN JOB NO. 188-08-1354  
PO/WO NO. 6525  
WORK LOCATION HAWKESBURY  
ACCEPTANCE STD. ASTM 1417/CS1-03 REV./DATE 2005

JOB DESCRIPTION PROCEDURE NO. LT-0002 REV./DATE TECHNIQUE NO. LT-TECH REV./DATE

PART NO. 3pcs D412664203 MATERIAL ALODINED ALUM. THICKNESS

SCOPE 2pcs D212664/01

SCOPE WET FLUORESCENT LIQUID PENETRANT INSPECTION 100% EXTERNAL SURFACE

TEST DETAILS

METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH	<input type="checkbox"/> SOLVENT REMOVABLE	<input type="checkbox"/> POST EMULSIFIED
FAMILY BRAND	BLACK LIGHT S/N 8171				
PENETRANT	MINIMUM DWELL TIME 40-45 MIN.				
PENETRANT REMOVER	H2O MINIMUM DRY TIME >10 MIN.				
DEVELOPER	SKD 20 MINIMUM DWELL TIME 10 MIN.				
DEVELOPER TYPE	<input type="checkbox"/> NON AQUEOUS	<input checked="" type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY	OTHER CAL FEB 12 2008	
LIGHT METER S/N					
CAL DUE DATE					

TEST SURFACE

SURFACE CONDITION	<input type="checkbox"/> AS GROUND	<input type="checkbox"/> AS WELDED	<input type="checkbox"/> MACHINED	<input type="checkbox"/> SHOT BLASTED	<input checked="" type="checkbox"/> CLEAN BARE METAL
SURFACE TEMPERATURE	< -4°C/ 20°F - 4°C/ 20°F TO 10°C/50°F 10°C/50°F TO 52°C/125°F > 52°C/125°F				

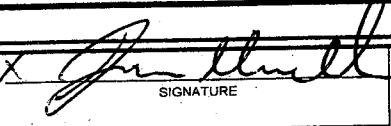
RESULTS- ( METRIC  IMPERIAL)

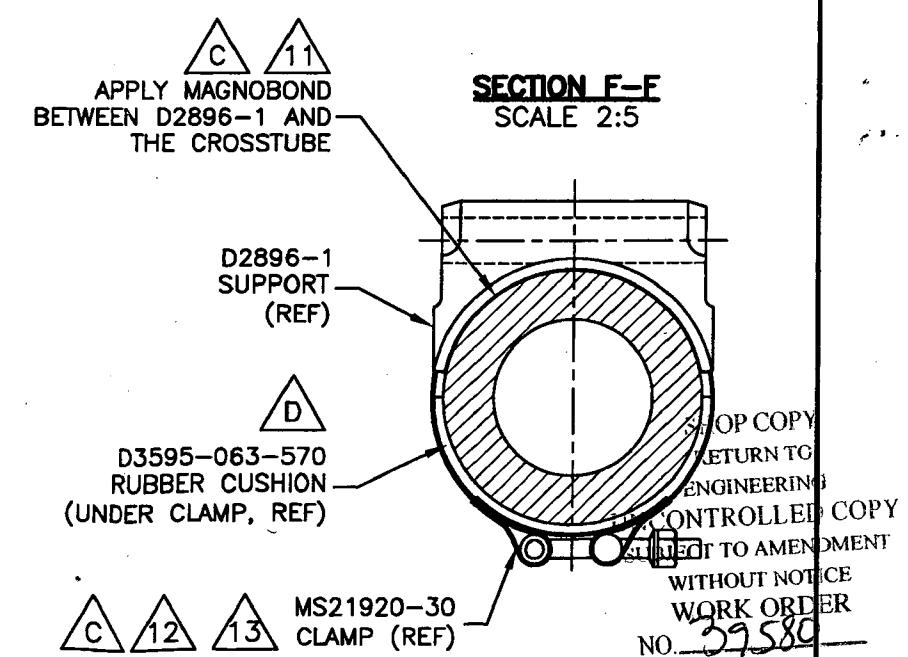
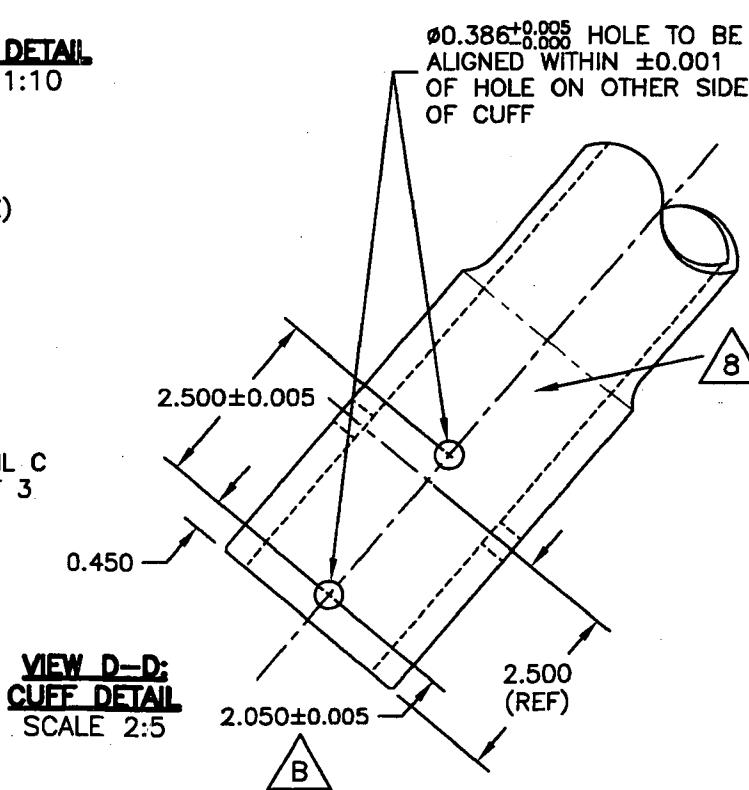
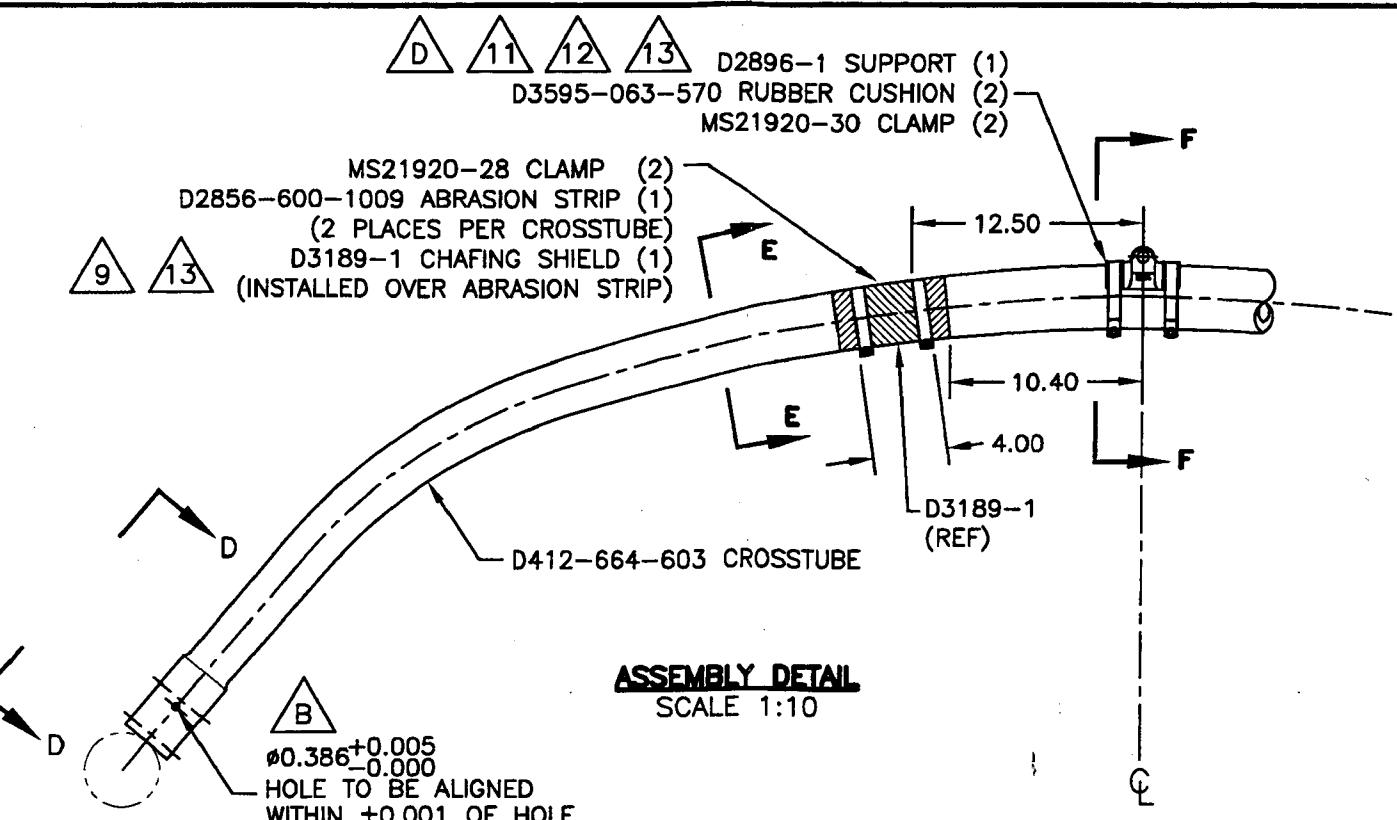
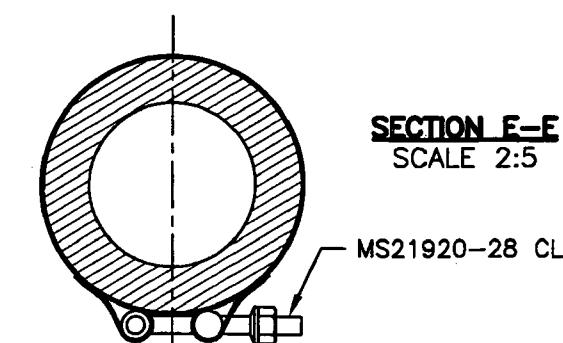
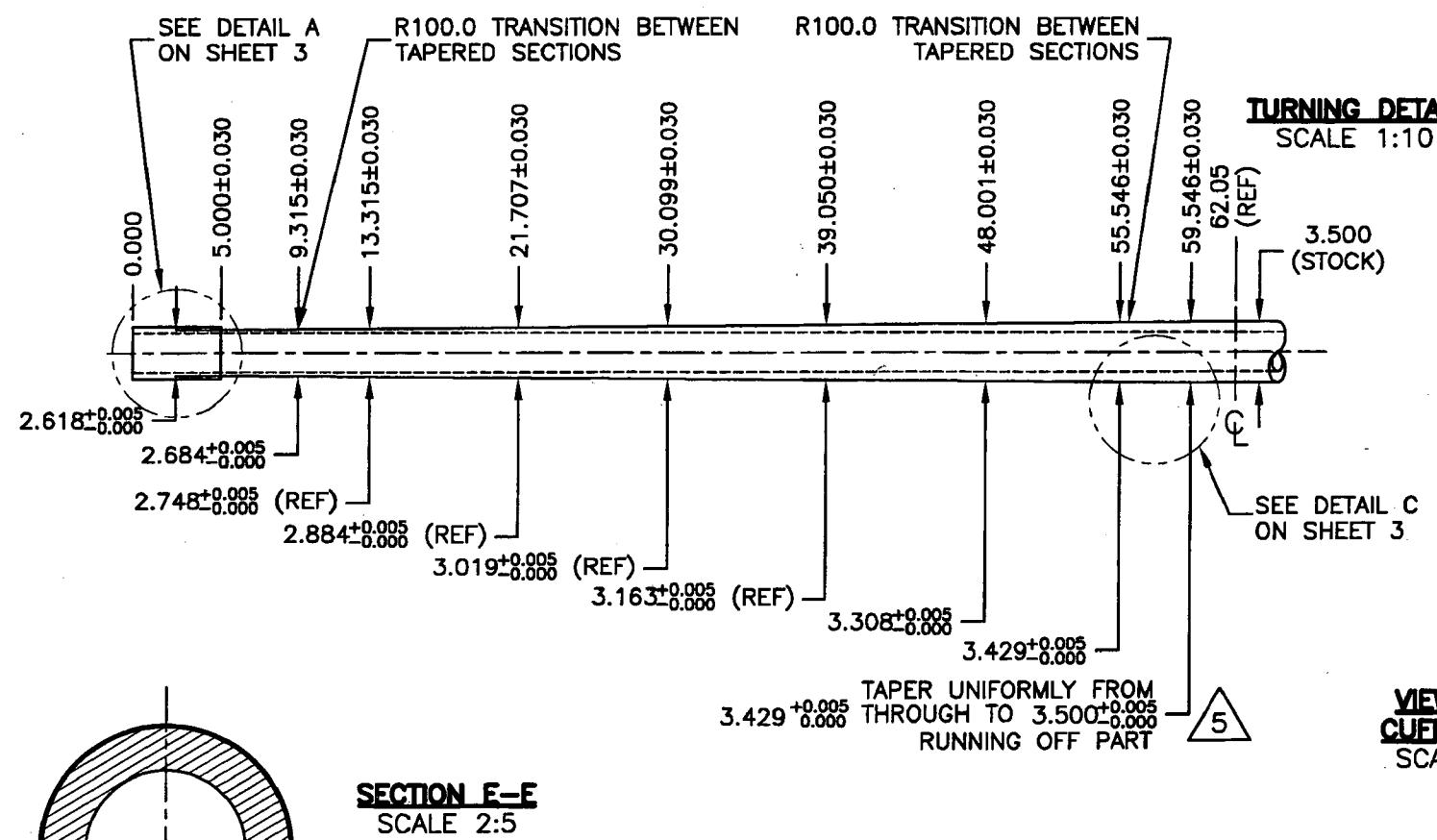
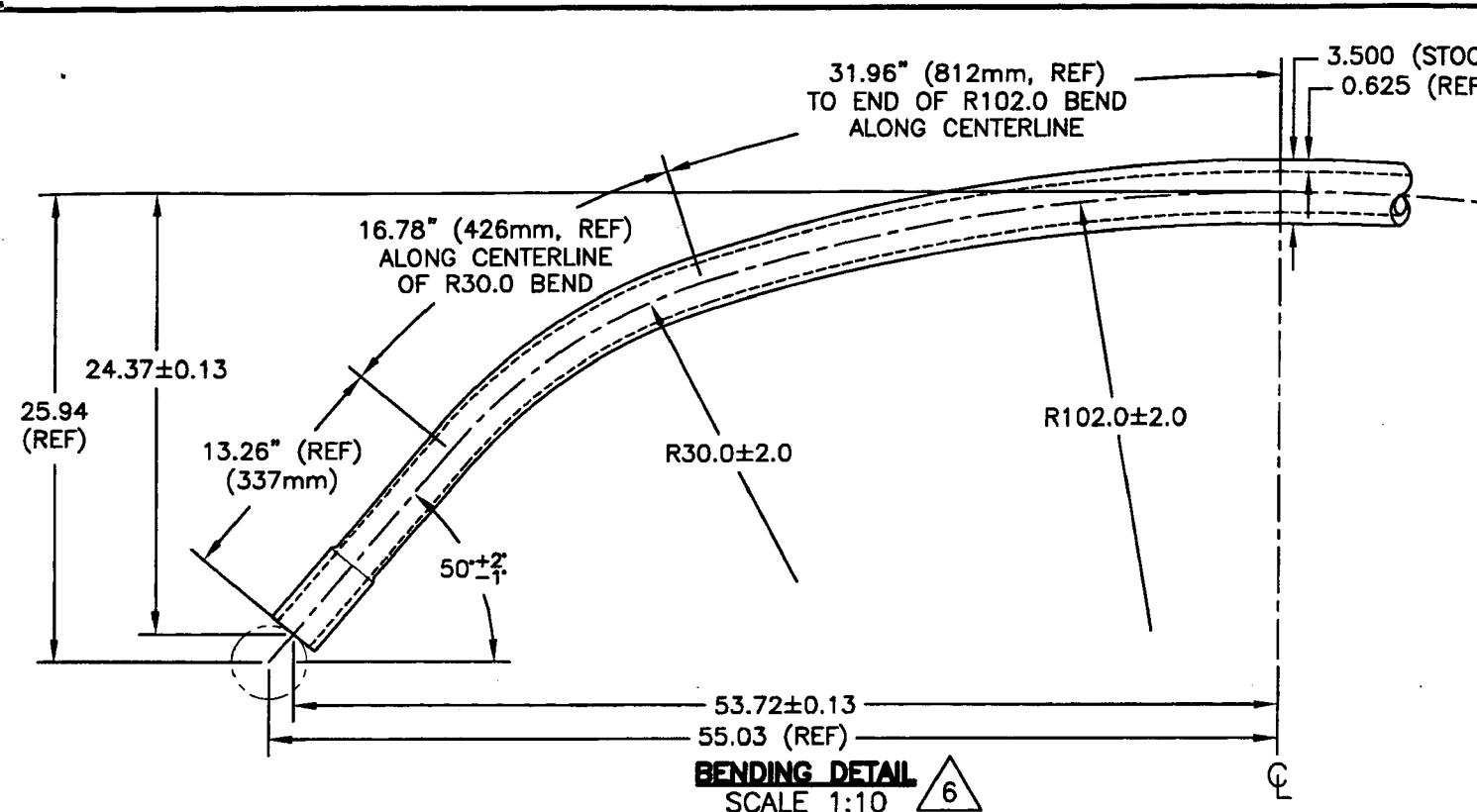
ITEM	COMMENTS	ACCEPT	REJECT	
	FLUORESCENT LIQUID PENE. INSPI. CARRIED OUT ON 100% OF EXTERNAL SURFACE ONLY			
3pcs	203 - JOB# 39579, (39580) 38965			
2pcs	101 - JOB# 39273, 39274			
				MW 06/06/10
	RESULTS NO INDICATIONS OF DEFECTS			
	ITEMS ACCEPTABLE TO STANDARD			

Scope of Services  
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood as that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as the representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care  
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

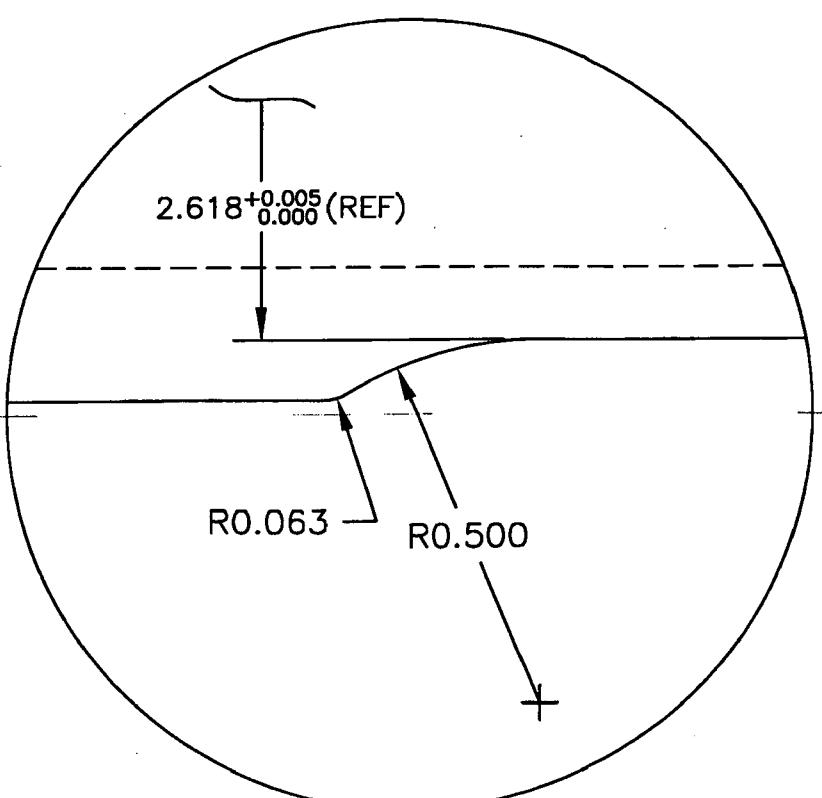
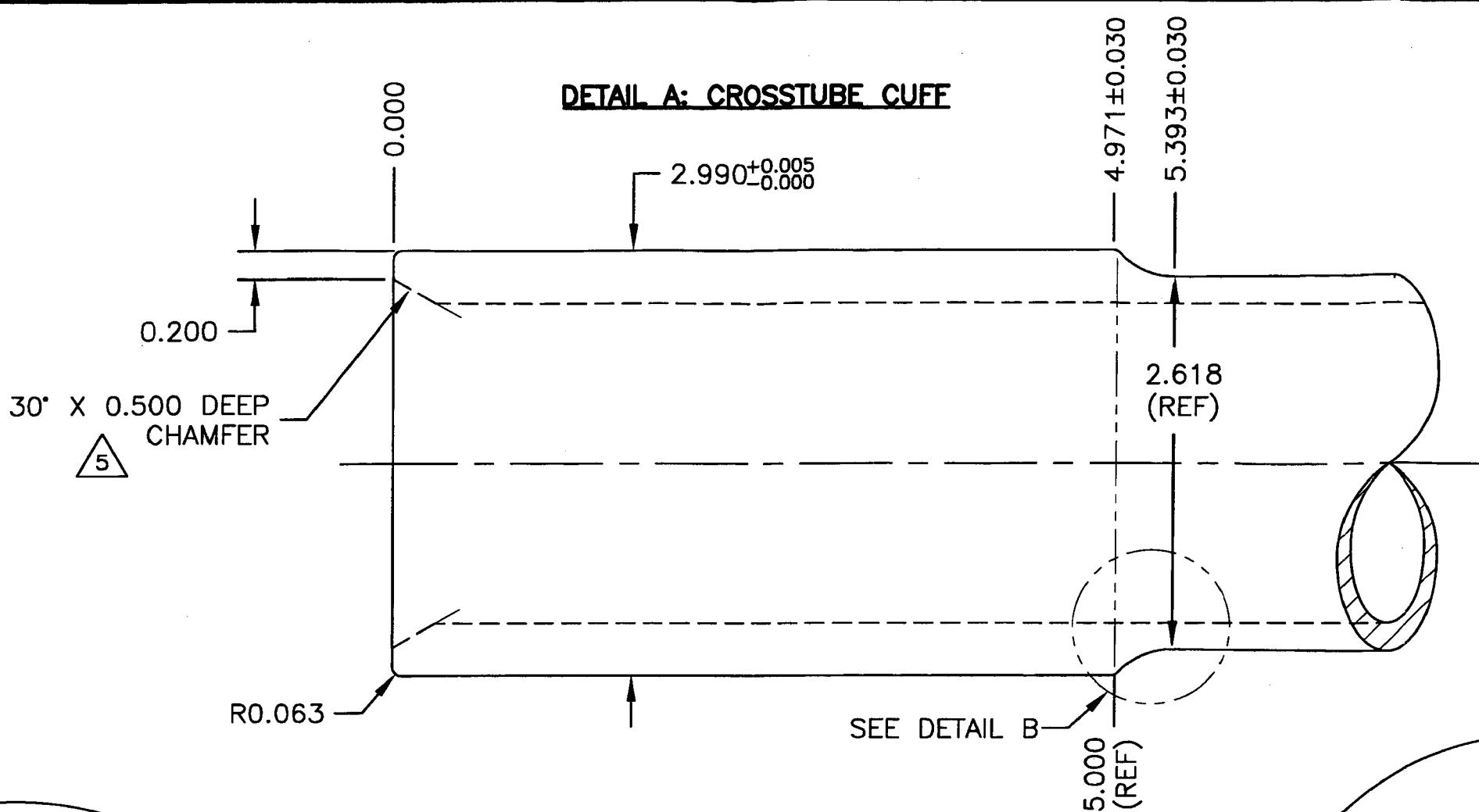
## SIGNATURES

CLIENT REPRESENTATIVE		PRINT		SIGNATURE	DTR #
TECHNICIAN (SIGNATURE):				REPORT REVIEWED BY:	
NAME (PRINT):		1 <sup>ST</sup> TECHNICIAN CGSB LEVEL 2 SNT LEVEL		2 <sup>ND</sup> TECHNICIAN CGSB LEVEL SNT LEVEL	NAME INITIALS
		CGSB REG. NO. 9901		CGSB REG. NO.	



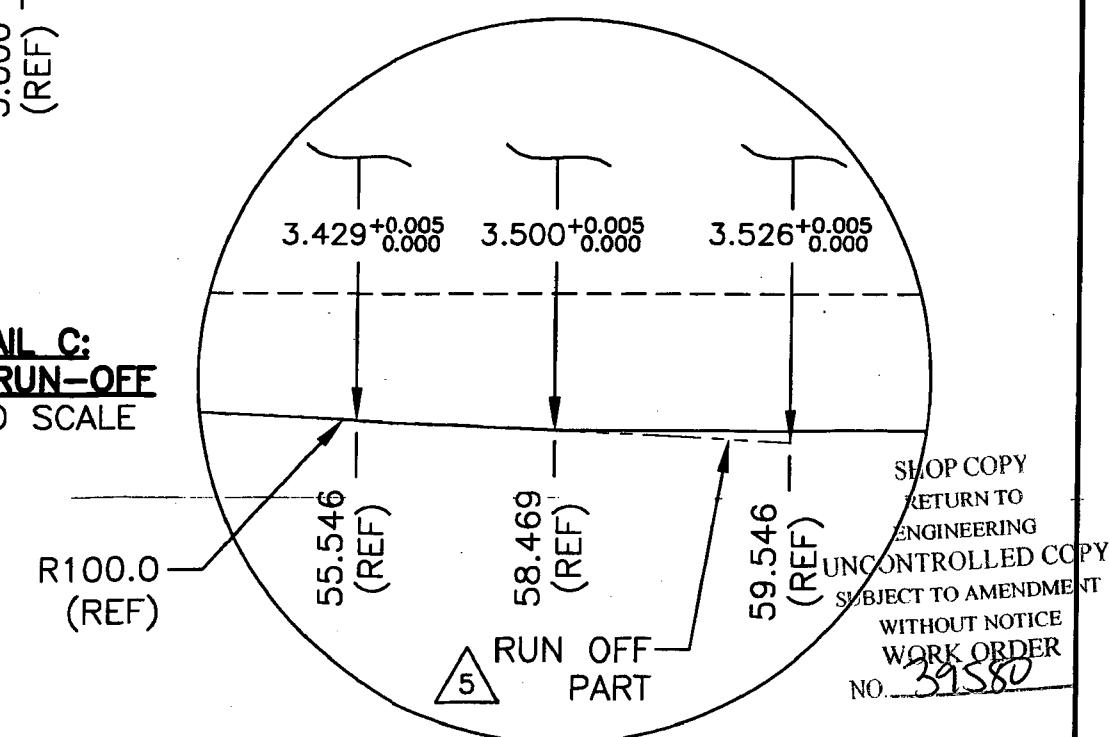
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	CHECKED	APPROVED	DRAWING NO.	REV. D
	<i>GP</i>	<i>PH</i>	D412-664-243	SHEET 2 OF 3
DATE	TITLE		SCALE	
07.03.09	CROSSTUBE ASSEMBLY (412 HI AFT)		1:10	

RELEASED  
07-04-24P  
PER ECN 889



**DETAIL B: CUFF  
TRANSITION**  
SCALE 4:1

**DETAIL C:  
TAPER RUN-OFF**  
NOT TO SCALE



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DESIGN	PH	DRAWN BY	PH	DART	DART AEROSPACE LTD. HAWKSBURY, ONTARIO, CANADA
CHECKED	<i>b</i>	APPROVED	<i>PH</i>	DRAWING NO.	REV. D D412-664-243 SHEET 3 OF 3
DATE	07.03.09	TITLE	CROSSTUBE ASSEMBLY (412 HI AFT)	SCALE	1:1